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PENSOFT

Drepanolejeunea pinnatiloba Schiffn. (Lejeuneaceae): a rare species in Brazil rediscovered after 17 years

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Abstract
Drepanolejeunea pinnatiloba Schiffn. (Lejeuneaceae) has only been collected once in Brazil, from a single population in the Atlantic Forest in southern Bahia state. Seventeen years later, we report the second record of *D. pinnatiloba*. This new record is from the Una Biological Reserve, also in southern Bahia. We discuss the geographic distribution and evaluate conservation status of this species for Brazil and the Neotropical region.

Keywords
Atlantic Forest, conservation status, liverwort, Una Biological Reserve.

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Introduction

Drepanolejeunea (Spruce) Schiffn. is a large pantropical genus with approximately 100 species that present very small plants, 1.5 cm long and 0.3–1(1.3) mm wide, with light green to pale-brown, creeping gametophytes (Gradstein and Costa 2003). Most of these species colonize rather ephemeral substrates such as leaves, and more rarely tree trunk bases, wood debris, and rotten logs (Bastos 2019).

Drepanolejeunea pinnatiloba Schiffn. (Lejeuneaceae) is a Neotropical species reported from Puerto Rico, Guyana and French Guyana, Panama, Dominica Island, Lesser Antilles, Cuba, and Venezuela (Bischler 1964; Gradstein and Florschütz-de Waard 1989; Gradstein and Allen 1992; Boggan et al. 1997; Stotler et al. 1998; Schäfer-Verwimp 1999; Mustelier and Vicario 2000; Ilkiu-Borges and Dauphin 2002). In Brazil, it was collected once in 1999 in the Atlantic Forest in Bahia State (Bastos and Yano 2004).

During the preparation of a bryofloristic inventory of the Una Biological Reserve (REBIO Una), a protected area of Atlantic Forest (Reis and Pôrto in prep.), one new population of *D. pinnatiloba* was discovered. Considering the rarity of this species in Brazil, we report its rediscovery in Brazil. We also discuss its geographic distribution and evaluate its conservation status.

Methods

The new population of *D. pinnatiloba* was found on 26 January 2015, in an area known as "Príncipe" in the REBIO Una (Fig. 1), located in Una municipality, Bahia, Brazil. The vegetation in this region is classified as dense

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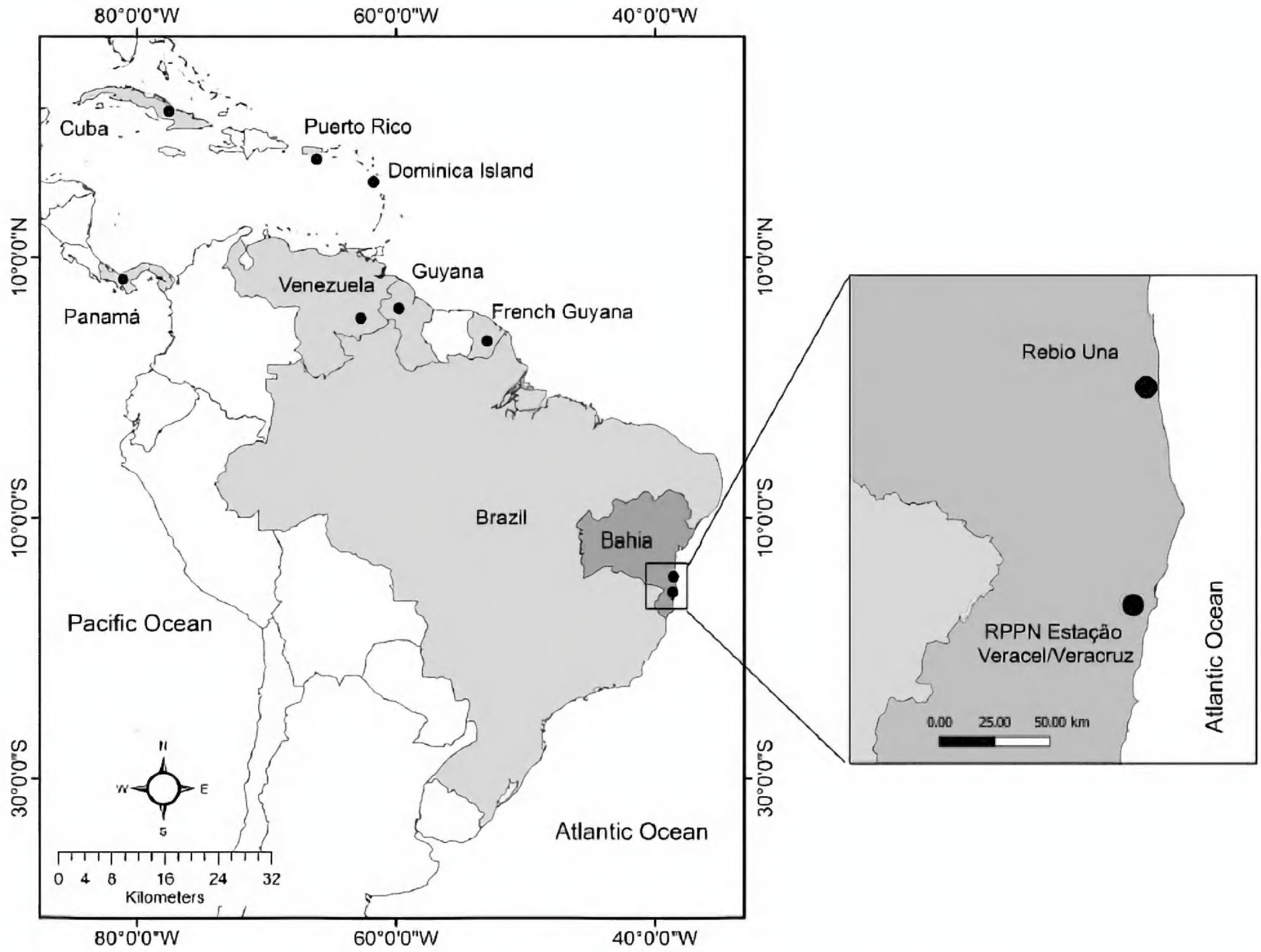


Figure 1. Occurrence areas of *Drepanolejeune pinnatiloba* in the neotropical region and Brazil. The highlighted area shows the location of the two populations known in Brazil.

tropical lowland rainforest (Oliveira-Filho and Fontes 2000), and the annual average rainfall and temperature in Una municipality are approximately 1,300 mm and 24 °C, respectively (Thomas and Carvalho 2003). The collected material is deposited in the Universidade Federal de Pernambuco Geraldo Mariz Herbarium (UFPE).

The botanical identification was based on the studies of Bischler (1964) and Bastos and Yano (2004). We calculated the area of occupancy (AOO) using the GEOCAT platform (Bachman et al. 2011) and the guidelines proposed for bryophytes by the IUCN Bryophytes Specialist Group (Hallingbäck et al. 1996; Hallingbäck and Hodgetts 2000).

Results

***Drepanolejeunea pinnatiloba* Schiffn.**

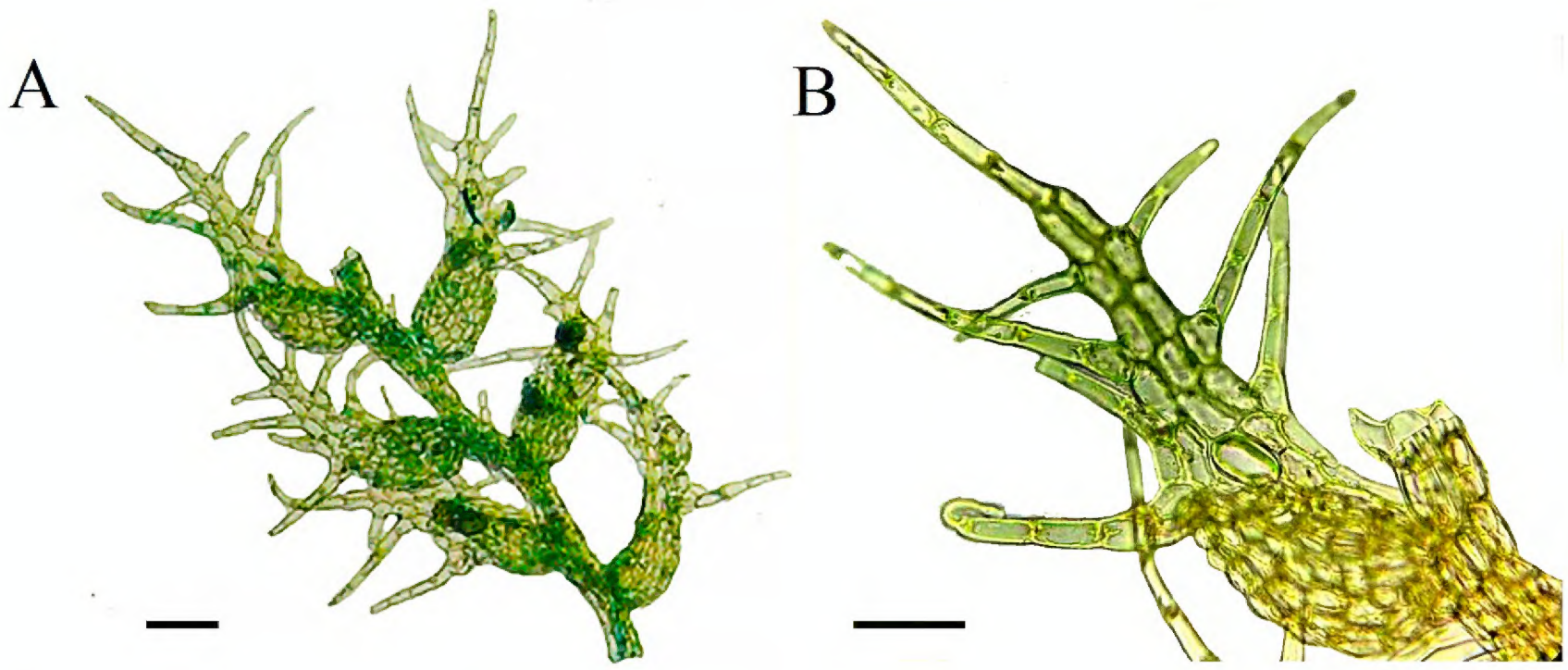
New records. Brazil. • Bahia, Una municipality, Una Biological Reserve, in an area known as "Príncipe"; 15°10′ 39″S, 039°04′10″W; 26 Jan. 2015; L.C. Reis TM020 (UFP 82,883).

Drepanolejeunea pinnatiloba is distributed in an area extending from Cuba to northern South America, with two records in Brazil, including the new one. Apparently, this species is restricted to preserved native tropical old-growth forests.

Drepanolejeunea pinnatiloba is classified as globally Endangered according to IUCN criteria, with an AOO estimated to be less than 40,000 km^2. In Brazil, this species is considered Critically Endangered, with an AOO estimated to be less than 8,000 km^2, with only two populations known in the country.

Identification. Plants minute, green, scarcely branched. Leaves distant, erect-spreading; lobe deep laciniate, segments unisseriate, 4–6 cells long, apical segments lesser, 3 or 4 cells long; cells oblong to rectangular, thin-walled, trigones and intermediate thickenings absent; ocelli 2 or 3 basal; lobule ovate, inflated, free margin involute, apical tooth acute, falcate, apical margin straight, keel arched, crenate. Underleaves small, distant, lobes unisseriate, 3 cells long, 2 cells wide at base, divergent to parallel, sinus lunate to widely acute. Stems with ventral merophyte of 2 cells wide.

Drepanolejeunea pinnatiloba can be easily recognized by the deeply laciniate, uniseriate, 4–6-celled long leaf lobes, absence of trigones, leaves with 2 basal and conspicuously enlarged ocelli, ovate, inflated lobules which are never reduced, with arched, crenate keels and an apical long-falcate tooth. Vegetative reproduction is unknown for this species. The characteristics of the species collected in the REBIO Una agree with descriptions by Bischler (1964) and Bastos and Yano (2004) (Fig. 2).



Figures 2. *Drepanolejeunea pinnatiloba* Schiffn. **A.** Gametophyte. **B.** Leaf. **C.** Lobule. **D.** Underleaf. Scale bars = 100 µm.

Discussion

Seventeen years after the first collection of *Drepanolejeunea pinnatiloba* in Brazil, the species was rediscovered 250 km from the first locality, in the same geographic region (southern Bahia) and phytogeographic domain (Atlantic Forest). This suggests that *D. pinnatiloba* has a very small geographic range in Brazil. Unfortunately, the Brazilian Atlantic Forest has been continuously undergoing intense loss and fragmentation caused by anthropic activities mainly related to urban expansion, agriculture, and livestock rearing (Tilman and Clark 2014). The REBIO Una is a key area for the maintenance of biodiversity in the Brazilian Atlantic Forest, as its inserted in a region of high diversity and endemism (Mori et al. 1983; Thomas et al. 1998; Amorim et al. 2008; Murray-Smith et al. 2008).

In the Neotropical region, *D. pinnatiloba* is typically found in dense tropical rainforests with little anthropization and in areas with high biodiversity (Gradstein and Florschütz-de Waard 1989; Gradstein and Allen 1992; Schäfer-Verwimp 1999; Mustelier and Vicario 2000; Ilkiu-Borges and Dauphin 2002; Bastos and Yano 2004). It usually forms few and small populations. Notwithstanding the increasing number of surveys carried out in Atlantic Forest fragments in Brazil over the last decades, including in protected areas (e.g. Germano and Pôrto 1996; 1997; 1998; Costa 1999; Valente and Pôrto 2006; Campelo and Pôrto 2007; Alvarenga et al. 2008; Bastos and Valente 2008; Oliveira and Bastos 2014; Reis et al. 2015), *D. pinnatiloba* had not been collected since the initial discovery in Brazil by Bastos and Yano (2004).

The REBIO Una record of *D. pinnatiloba* is from one very small population collected in a very humid rotten log next to a stream. This new record is particularly important for updating the data about the Brazilian bryophyte flora and setting strategies for this species' conservation. The fact of this species being found only in Atlantic Forest brings gives increased concern about its conservation (Ribeiro et al. 2009).

The present work provides support for the inclusion of *D. pinnatiloba* among the endangered species in the Red Flora Book of Brazil (CNCFlora 2013). We also recommend more field surveys, especially in areas with a high level of conservation, to discover more populations and increase its area of distribution.

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Authors' Contributions

LCR collected and identified the species and wrote the text; HCO described the species and contributed to the writing of paper; KCP contributed to the discussion and improvement of the text.

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